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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,875	07/10/2003	Andreas Molisch	MH-5144	1554

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MITSUBISHI ELECTRIC RESEARCH LABORATORIES, INC.
201 BROADWAY
8TH FLOOR
CAMBRIDGE, MA 02139

EXAMINER	
VLAHOS, SOPHIA	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/616,875	MOLISCH ET AL.	
	Examiner	Art Unit	
	SOPHIA VLAHOS	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 February 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Remarks, filed 2/5/2007, with respect to the rejection(s) of claim(s) independent claim 1 under 35 U.S.C. 102(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Richards (U.S. 2003/0232612).

Drawings

2. The drawing (Fig. 2) were received on 2/5/2007. This drawing is acceptable.

Claim Objections

3. Claim 1 is objected to because of the following informalities: Line 11 of claim 1 recites: "over a the time interval..." the "a" should be removed.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-6, 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards (U.S. 2003/0232612) in view of Ylitalo et. al., (U.S. 6,215,814), Tewfik et. al., (U.S. 2004/0141559) and Nillson (U.S. 6,835,689).

With respect to claim 1, Richards discloses: transmitting and receiving in parallel a plurality of (data) sequences (Fig. 6, shows an UWB transmitter and Fig. 17, a UWB receiver, where the sequentially transmitted signals are sequentially received in parallel by the bank of correlators shown in Fig. 17, see first sentence of paragraph [0192]), each sequence being modulated at a chip rate (see middle of paragraph [0003],paragraph [0004] and paragraph [0181] where UWB systems are high chipping systems); each sequence consisting of ultrawide bandwidth radio pulses (see first sentence of paragraph [0074]); sampling each sequence in parallel with multiple correlators at a sampling rate substantially lower than the chip rate to obtain a plurality of samples for each sequence (see portion of paragraph [0193] on the right side column where the correlators operate at a lower frequency compared to the first stage that processes signals at chip rate))

Richards does not teach: a training sequence; each training sequence being different; in which the samples span a time interval corresponding to an impulse response of the channel; and estimating the impulse response of the channel of the channel over the time interval corresponding to the impulse response of the channel from the plurality of samples of the plurality of training sequences at a resolution substantially equal to the chip rate.

In the same field of endeavor (channel estimation) Ylitalo et. al., disclose: a training sequence (see Fig. 2C, column 4, lines 61-63, pilot signal used for channel estimation see also, column 2, lines 10-13), and estimating the impulse response of the channel over the time interval corresponding to the impulse response of the channel from the plurality of samples of the plurality of training sequences (Fig. 2C, block 272, "Channel Estimator", and column 2, lines 10-13, column 8, lines 55-61, see estimation of channel impulse response).

In the same field of endeavor, Tewfik et. al., disclose: training sequence consisting of ultrawide bandwidth radio pulses (see last two sentences of paragraph [0067], and paragraph [0003] mentioning UWB pilot signals).

Therefore at the time of the invention, it would have been obvious to a person skilled in the art to modify the system of Richards based on the teachings of Ylitalo et. al. and Tewfik et. al., so that UWB training sequences are received (implying that they are also transmitted) and the impulse response of the channel is estimated over the time interval corresponding to the impulse response of the channel from the plurality of samples of the plurality of training sequences (channel estimation as taught by Yitalo and Tewfik) and the motivation to a person skilled in the art to perform such a modification is to use the estimated impulse response of the channel to remove the effects of multipath at the receiver (Ylitalo et. al., column 8, lines 55-61).

In the same field of endeavor, Nillson discloses: each training sequence being different (column 2, lines 1-5).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the system of Richards based on the teachings of Nillson so that each training sequence is different, and the motivation to perform such a modification is that employing transmit diversity (and transmit different training sequences) overcomes the effects of fading, outages and circuit failures (see Nillson et. al., column 1, lines 25-30).

With respect to claim 2, the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson does not teach: in which each training sequence is passed through *n* correlators to generate *n* samples for each correlator.

At the time of the invention, it would have been obvious to a person of ordinary skill to modify the system of Richards, Ylitalo, Tewfik et. al., and Nillson, so that training sequence is passed through n correlators to generate n samples for each correlator, and the motivation behind such a modification is the available space, components, power consumption requirements of the system.

With respect to claim 3, the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson does not teach: in which the sampling rate is at least ten times slower than the chip rate.

At the time of the invention, it would have been obvious to a person skilled in the art to modify the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson to have a sampling rate that is at least ten time

slower than the chip rate and the motivation to perform such a modification is that a sampling rate that is at least ten times slower than the chip rate, reduces computation load as well as the power consumption of the system (Richards, paragraph [0193] portion on right column, considering that the UWB system of Richards operates at chip rates, here the bank of correlators operates at a lower frequency but does not mention the specific sampling rate).

With respect to claim 4, the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson does not teach: in which the sampling rate is equal to a symbol rate.

At the time of the invention, it would have been obvious to a person skilled in the art to modify the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson does not teach to have a sampling rate that is equal to a symbol rate, and the motivation to perform such a modification is that a sampling rate that is equal to a symbol rate (i.e. slower than the systems high chip rate) (see that Richards, paragraph [0193] portion on right column, mentions that the correlators operate at a lower frequency but does not mention the specific sampling rate as a symbol rate) reduces computation load as well as the power consumption of the system.

With respect to claim 5, the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson further discloses: estimating equalizer coefficients from an equalizer training sequence consisting of radio pulses (see

Ylitalo et. al., column 8, lines 55-61, where the complex impulse response taps of the channel are estimated using the channel estimator (that receives radio signals) these correspond to equalizer coefficients since the function of an equalizer is to remove (undo) the effects of the channel on received signal).

With respect to claim 6, the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson further discloses : estimating weights for the corresponding correlators to acquire most of the available energy of a data signal received via the estimated channel (see column 10 and lines 37-42 of Ylitalo et. al., and Fig. 2C block 272 and the weights it generates supplied to corresponding correlators (despreaders) and the SINR is maximized i.e. the signal energy is maximized), in which the data signal consists of ultra wide bandwidth radio pulses (the system of ... uses UWB pulses).

With respect to claim 9,claim 9 is rejected based on a rationale similar to the one used to reject claim 2 above.

With respect to claim 10, the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson does not specifically teach: in which the chip rate is chip rate on the order of 10GHz (Richards mentions the system has a high chipping rate see middle of paragraph [0003]).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the system obtained based on the teachings of Richards,

Ylitalo, Tewfik et. al., and Nillson, so that it has a chip rate on the order of 10Ghz, and the motivation is that such a chipping rate allows for high data rate (see middle of paragraph [0003] of Richards).

6. Claims 7-8, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards (U.S. 2003/0232612) in view of Ylitalo et. al., (U.S. 6,215,814), Tewfik et. al., (U.S. 2004/0141559) Nillson (U.S. 6,835,689) and further view of Jung et. al. (U.S. 2004/0097204).

With respect to claim 7, the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson does not teach: in which a first subset of the samples are used for a rough estimate, and a second subset of the samples are used for an accurate estimate based on the rough estimate.

In the same field of endeavor, (rake receivers) Jung et. al disclose: in which a first subset of the samples are used for a rough estimate (Fig. 2, rake receiver, blocks CE (Channel Estimator) and CU (Calculation Unit), SB (Assessment and Control Unit) and switches under DEAK control, see paragraphs [0037], [0051]-[0057], where the initially connected rake fingers provide the first subset of samples, and the initial channel estimate correspond to the first subset of samples used for a rough estimate) , and a second subset of the samples are used for an accurate estimate based on the rough estimate (paragraphs [0037], [0054]-[0057] where the rake fingers are disconnected , and an accurate channel estimate is obtained based on the rough estimate (see last sentence of paragraph [0052] where the initial rough estimate is used for energy

calculation, upon which rake fingers are disconnected or remain connected providing the second subset of samples)).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the system obtained based on the teachings of Richards, Ylitalo, Tewfik et. al., and Nillson based on the teachings of Jung et. al., so that a first subset of the samples are used for a rough estimate, and a second subset of the samples are used for an accurate estimate based on the rough estimate, so that power consumption is reduced (see Jung et. al., section of paragraph [0013] on page 2).

With respect to claim 8, claim 8 is rejected based on a rationale similar to the one used to reject claim 7 above (the previous estimate is the rough/initial estimate).

With respect to claim 11, claim 11 is rejected based on a rationale similar to the one used to reject claim 7 above (where the second subset of samples corresponds to the samples obtained after disconnecting/connecting rake fingers based on channel information (from training sequences) to determine the energy of the levels, of the first subset f samples (initially connected rake fingers)).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**.

See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number is 571 272 5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SV
4/13/2007

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER